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## PATENT ABSTRACTS OF JAPAN

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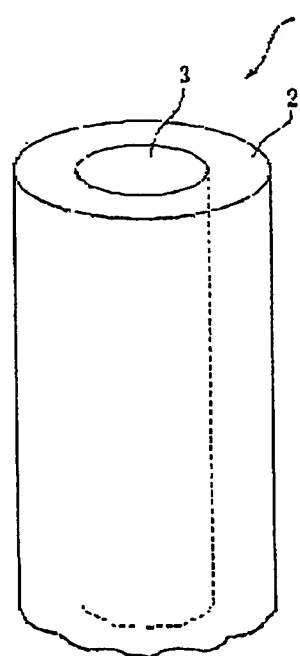
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(54) HEAT STORAGE FIBER, METHOD FOR PRODUCING THE SAME, AND HEAT STORAGE CLOTH MATERIAL

(57)Abstract:

PROBLEM TO BE SOLVED: To provide an easily treatable heat storage fiber having heat storage property.

SOLUTION: This heat storage fiber 1 is obtained by composite spinning of a sheath-core structure to have a cross section having a core of a heat storage material 3 and a sheath of a synthetic resin fiber 2. The heat storage cloth materials such as textiles, knitted fabrics and nonwoven fabrics are obtained by using the heat storage fiber 1. As the heat storage material 3, e.g. one having  $\geq -20^{\circ}\text{C}$  but  $\leq 80^{\circ}\text{C}$  melting point and a relatively large heat of fusion/ solidification energy is used. The heat storage material 3 continues along the axial direction of the synthetic resin fiber 2 and so is hardly fractured by bending stress or tensile stress, easily treatable and capable of increasing manufacturability and yielding percentage. The heat storage material 3 is separated from the outside, does not flow out even if being molten, stably exhibits heat storage property for a long time and causes no disfigurement of the fiber and the materials due to melting and solidifying of the heat storage material 3 and the fiber



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CLAIMS

[Claim(s)]

[Claim 1] Accumulation nature fiber characterized by providing plastic fiber and the accumulation nature matter mixed in this plastic fiber by the longitudinal direction by carrying out abbreviation continuation in the \*\*\*\*\* direction.

[Claim 2] Accumulation nature fiber characterized by having made plastic fiber into the sheath section and being formed in sheath-core structure by using the accumulation nature matter as a core part in accumulation nature fiber according to claim 1.

[Claim 3] It is accumulation nature fiber characterized by the accumulation nature matter having large heat-of-fusion energy and heat-of-solidification energy in accumulation nature fiber according to claim 1 or 2 as compared with plastic fiber.

[Claim 4] The accumulation nature matter is accumulation nature fiber to which it is characterized by the melting point being -20 degrees C or more 80 degrees C or less in accumulation nature fiber according to claim 1 to 3.

[Claim 5] It is accumulation nature fiber characterized by being mixed without exposing the accumulation nature matter from the peripheral face of plastic fiber in accumulation nature fiber according to claim 1 to 4.

[Claim 6] The manufacture method of the accumulation nature fiber characterized by carrying out spinning of the resin mixture which the accumulation nature matter and synthetic resin were mixed and was fabricated in the shape of a pellet.

[Claim 7] The manufacture method of the accumulation nature fiber characterized by changing compound spinning into the state of carrying out \*\*\*\*\* continuation of the resin moldings which the accumulation nature matter and synthetic resin were mixed and was fabricated in the shape of a pellet in the core of synthetic resin at shaft orientations.

[Claim 8] The manufacture method of the accumulation nature fiber characterized by the aforementioned accumulation nature matter carrying out compound spinning of the accumulation nature matter and the synthetic resin in the state where it is located in the core part of sheath-core structure.

[Claim 9] accumulation \*\*\*\* characterized by providing accumulation nature fiber according to claim 1 to 5 in part at least -- a member

[Claim 10] accumulation \*\*\*\* characterized by providing at least the accumulation nature fiber manufactured by the manufacture method of accumulation nature fiber according to claim 6 to 8 in part -- a member

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DETAILED DESCRIPTION

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[Detailed Description of the Invention]

[0001]

[The technical field to which invention belongs] this invention relates to accumulation nature fiber with the accumulation nature member, its manufacture method, and an accumulation \*\*\*\* member.

[0002]

Background of the Invention] The accumulation member with the accumulation nature developed variously is used for the clothes worn in the remarkable environment of a temperature change from the former. What applied to cloth the microphone capsule which generally enclosed the matter which has the melting point near ordinary temperature, and fixed in the member which has such accumulation nature, the thing which carried out spinning of the synthetic resin containing a microcapsule, and made the obtained fiber the fabric, i.e., cloth, are known.

[0003]

[Problem(s) to be Solved by the Invention] However, in the thing which made cloth apply and fix the conventional microcapsule, the adhesives for making cloth fix a microcapsule are needed. And since these adhesives make sufficient accumulation nature and sufficient endurance discover, there is [ a problem from which the feeling of the cloth after having to stop having had to use it so much and being applied serves as hard ].

[0004] Moreover, in order to raise the amenity at the time of wearing clothes, for example, in addition to heat retaining property, moisture permeability, moisture absorption and desorption characteristics, water resistance, etc. are needed. However, when a microcapsule is applied to cloth etc. with adhesives and it fixes, although heat retaining property improves, the moisture permeability of cloth etc. falls with a binder and it has a possibility that it may not function good as clothes.

[0005] On the other hand, a microcapsule is formed in the size of the grade which exists on structure. The particle diameter of a microcapsule is large to the path size of fiber what uses as cloth the fiber obtained by carrying out spinning of the synthetic resin containing a microcapsule by this. For this reason, there is a possibility of producing cutting, i.e., the thread breakage, in the cases, such as a spinning process and a foldout process to cloth.

[0006] this invention aims at having accumulation nature and offering accumulation nature fiber with easy handling, its manufacture method, and an accumulation \*\*\*\* member in view of such a point.

[0007]

[Means for Solving the Problem] The accumulation nature fiber of this invention is characterized by providing plastic fiber and the accumulation nature matter mixed in this plastic fiber by the longitudinal direction by carrying out abbreviation continuation in the \*\*\*\* direction.

[0008] As accumulation nature matter in this invention, if it has accumulation nature, there is especially no limitation, and it can use what has the suitable melting point according to a use, choosing it suitably. For example, a paraffin hydrocarbon, a natural wax, a petroleum wax, a polyethylene glycol, the hydrate of an inorganic compound, etc. are mentioned. The paraffin hydrocarbon which has the melting point at about 5-50 degrees C especially preferably is desirable -20-80 degrees C. As such a paraffin

hydrocarbon, an OKUTA decane (28 degrees C of melting points), a heptadecane (23 degrees C of melting points), a hexadecane (18 degrees C of melting points), etc. are mentioned, for example. In addition, it is also possible to use together two or more accumulation nature matter which has the different melting point.

[0009] As synthetic resin which constitutes plastic fiber, there is especially no limitation, for example, it can use nylon, polyester, polyurethane, a Vinyon, an ethylene vinylacetate copolymer, a vinylidene, a polyvinyl chloride, acrylic resin, polyethylene, polypropylene, a latex, etc. Moreover, as synthetic resin which constitutes plastic fiber, semi-synthetic resin, such as acetate, a diacetate, and a triacetate, can be used. Furthermore, regenerated-fiber material, such as rayon, etc. can be used.

[0010] The cloth of the good quality stabilized for a long period of time is obtained without being hard to produce the breakage in the case of processing, such as weaving into cloth, for example, having accumulation nature, and being torn by the stress from the outside, such as bending, while being hard coming to break to bending stress or hauling stress, and handling being easy and obtaining improvement in manufacturability and the yield, since abbreviation continuation is carried out and the accumulation nature matter is mixed in a longitudinal direction in the \*\*\*\*\* direction in plastic fiber in this invention.

[0011] The accumulation nature fiber of this invention is characterized by having made plastic fiber into the sheath section and being formed in sheath-core structure by using the accumulation nature matter as a core part.

[0012] Since the sheath section of sheath-core structure is used as plastic fiber and a core part is used as the accumulation nature matter in this invention, while the accumulation nature which did not flow out even if the accumulation nature matter changed into the state where it was isolated from the exterior and dissolved by heat change, and was stabilized for a long period of time is obtained, handling is easy, and improvement in manufacturability and the yield is obtained, for example, processing to cloth etc. also becomes easy. Furthermore, since it is in the state where the accumulation nature matter was isolated from the exterior, change of the appearance in dissolution and solidification of the accumulation nature matter is not produced, either.

[0013] The accumulation nature fiber of this invention is characterized by the accumulation nature matter having large heat-of-fusion energy and heat-of-solidification energy as compared with plastic fiber.

[0014] In this invention, since heat-of-fusion energy and heat-of-solidification energy use the large accumulation nature matter as compared with plastic fiber, accumulation nature good as fiber is obtained.

[0015] As for the accumulation nature fiber of this invention, the accumulation nature matter is characterized by -20-degree-C or more being 80 degrees C or less by the melting point.

[0016] In this invention, since the melting point used -20-degree-C or more accumulation nature matter 80 degrees C or less, when it is processed into cloth, for example and uses for clothes, good heat retaining property and heat insulation nature are obtained.

[0017] Here, if the melting point becomes lower than -20 degrees C, acquisition of the matter in which good accumulation nature is shown will be difficult, and cost will increase. Moreover, the conditions used as environment lower than -20 degrees C and environment higher than 80 degrees C are rare, the need as clothes is restricted, and there is a possibility that cost may increase. By this, the melting point uses -20-degree-C or more accumulation nature matter 80 degrees C or less.

[0018] For the accumulation nature fiber of this invention, the accumulation nature matter is characterized by being mixed without exposing from the peripheral face of plastic fiber.

[0019] Since it mixes in this invention, without exposing the accumulation nature matter from the peripheral face of plastic fiber, while the accumulation nature which did not flow out even if the accumulation nature matter changed into the state where it was isolated from the exterior and dissolved by heat change, and was stabilized for a long period of time is obtained, handling is easy, and improvement in manufacturability and the yield is obtained, for example, processing to cloth etc. also becomes easy. Furthermore, since it is in the state where the accumulation nature matter was isolated

from the exterior, change of the appearance in dissolution and solidification of the accumulation nature matter is not produced, either.

[0020] The manufacture method of the accumulation nature fiber of this invention is characterized by carrying out spinning of the resin mixture which the accumulation nature matter and synthetic resin were mixed and was fabricated in the shape of a pellet.

[0021] Since spinning of the resin mixture which the accumulation nature matter and synthetic resin were mixed and was fabricated in this invention in the shape of a pellet is carried out The state where the accumulation nature matter carries out abbreviation continuation, and mixes in the \*\*\*\*\* direction in the synthetic resin of accumulation nature fiber at a longitudinal direction is acquired easily, are hard coming to break to bending stress or hauling stress, and handling is easy. The cloth of the good quality stabilized for a long period of time is obtained without being hard to produce the breakage in the case of processing, such as weaving into cloth, for example, having accumulation nature, and being torn by the stress from the outside, such as bending, while improvement in manufacturability and the yield is obtained.

[0022] The manufacture method of the accumulation nature fiber of this invention is characterized by changing compound spinning into the state of carrying out \*\*\*\*\* continuation of the resin moldings which the accumulation nature matter and synthetic resin were mixed and was fabricated in the shape of a pellet in the core of synthetic resin at shaft orientations.

[0023] Since the compound spinning of the resin moldings which the accumulation nature matter and synthetic resin were mixed and was fabricated in this invention in the shape of a pellet is changed into the state of carrying out \*\*\*\*\* continuation to shaft orientations in the core of synthetic resin The state where the accumulation nature matter carries out abbreviation continuation, and mixes in the \*\*\*\*\* direction in the synthetic resin of accumulation nature fiber at a longitudinal direction is acquired easily, are hard coming to break to bending stress or hauling stress, and handling is easy. The cloth of the good quality stabilized for a long period of time is obtained without being hard to produce the breakage in the case of processing, such as weaving into cloth, for example, having accumulation nature, and being torn by the stress from the outside, such as bending, while improvement in manufacturability and the yield is obtained.

[0024] Furthermore, while the accumulation nature fiber in the state where the accumulation nature matter was isolated from the exterior is obtained and the accumulation nature which did not flow out even if dissolved by heat change, and was stabilized for a long period of time is obtained, handling is easy, and improvement in manufacturability and the yield is obtained, for example, processing to cloth etc. also becomes easy. Furthermore, since it is in the state where the accumulation nature matter was isolated from the exterior, change of the appearance in dissolution and solidification of the accumulation nature matter is not produced, either.

[0025] The manufacture method of the accumulation nature fiber of this invention is characterized by the aforementioned accumulation nature matter carrying out compound spinning of the accumulation nature matter and the synthetic resin in the state where it is located in the core part of sheath-core structure.

[0026] In this invention, since the accumulation nature matter carries out compound spinning of the accumulation nature matter and the synthetic resin in the state where it is located in the core part of sheath-core structure The state where the accumulation nature matter carries out abbreviation continuation, and mixes in the \*\*\*\*\* direction in the synthetic resin of accumulation nature fiber at a longitudinal direction is acquired easily, are hard coming to break to bending stress or hauling stress, and handling is easy. The cloth of the good quality stabilized for a long period of time is obtained without being hard to produce the breakage in the case of processing, such as weaving into cloth, for example, having accumulation nature, and being torn by the stress from the outside, such as bending, while improvement in manufacturability and the yield is obtained.

[0027] Furthermore, while the accumulation nature fiber in the state where the accumulation nature matter was isolated from the exterior is obtained and the accumulation nature which did not flow out even if dissolved by heat change, and was stabilized for a long period of time is obtained, handling is

easy, and improvement in manufacturability and the yield is obtained, for example, processing to cloth etc. also becomes easy. Furthermore, since it is in the state where the accumulation nature matter was isolated from the exterior, change of the appearance in dissolution and solidification of the accumulation nature matter is not produced, either.

[0028] Moreover, the sheath-core structure where the accumulation nature matter serves as a core part, and synthetic resin serves as the sheath section is acquired easily, and increase of the content of the accumulation nature matter can also be aimed at.

[0029] The accumulation \*\*\*\* member of this invention is characterized by providing accumulation nature fiber according to claim 1 to 5 in part at least.

[0030] In this invention, the good quality stabilized for a long period of time is obtained, without processing being easy and losing that have accumulation nature and handling also uses easy accumulation nature fiber with the stress from the outside. And it can use suitable for bedding, such as common garments, such as sport garments, such as skiwear and lane wear, a panty hose, a shirt, and a suit, a sheet, and a cotton pad, a glove, shoes material, or the food packing material as which keeping warm and heat insulation are required.

[0031] The accumulation \*\*\*\* member of this invention is characterized by providing at least the accumulation nature fiber manufactured by the manufacture method of accumulation nature fiber according to claim 6 to 8 in part.

[0032] In this invention, since the accumulation nature fiber manufactured by the manufacture method of accumulation nature fiber according to claim 6 to 8 that have accumulation nature and the manufacturability of accumulation nature fiber also with easy handling and improvement in the yield are obtained is used, processing is easy, and the good quality stabilized for a long period of time is obtained, without being torn by the stress from the outside. And it can use suitable for bedding, such as common garments, such as sport garments, such as skiwear and lane wear, a panty hose, a shirt, and a suit, a sheet, and a cotton pad, a glove, shoes material, or the food packing material as which keeping warm and heat insulation are required.

[0033]

[Embodiments of the Invention] Hereafter, the form of 1 operation of this invention is explained based on a drawing.

[0034] In drawing 1, 1 is accumulation nature fiber and this accumulation nature fiber 1 is formed in sheath-core structure. That is, accumulation nature fiber 1 follows the shaft orientations which are longitudinal directions in the shape of a \*\*\*\*\* approximate circle pillar, the accumulation nature matter 3 is formed in one, it makes plastic fiber 2 the sheath section, and the accumulation nature matter 3 is formed in the position of the medial axis of approximate circle tubed plastic fiber 2 as a core part. And the accumulation nature matter 3 is in the state where it was covered in plastic fiber 2, without exposing from the peripheral face of plastic fiber 2.

[0035] And as synthetic resin which constitutes plastic fiber 2, there is especially no limitation, for example, it can use nylon, polyester, polyurethane, a Vinyon, an ethylene vinylacetate copolymer, a vinylidene, a polyvinyl chloride, acrylic resin, polyethylene, polypropylene, a latex, etc. Moreover, as synthetic resin which constitutes plastic fiber 2, semi-synthetic resin, such as acetate, a diacetate, and a triacetate, can be used. Furthermore, regenerated-fiber material, such as rayon, etc. can be used.

[0036] Moreover, as for the accumulation nature matter 3, the melting point uses -20-degree-C or more thing 80 degrees C or less. Here, if the melting point becomes lower than -20 degrees C, acquisition of the matter in which good accumulation nature is shown will be difficult, and cost will increase.

Moreover, the conditions used as environment lower than -20 degrees C and environment higher than 80 degrees C are rare, the need as clothes is restricted, and there is a possibility that cost may increase. By this, the melting point uses -20-degree-C or more accumulation nature matter 80 degrees C or less.

[0037] In addition, as accumulation nature matter 3, the heat of fusion and heat-of-solidification energy are large in comparison, for example, if it has larger accumulation nature at least than the synthetic resin of plastic fiber, there is nothing, and especially limitation can use what has the suitable melting point according to a use, choosing it suitably. For example, a paraffin hydrocarbon, a natural wax, a petroleum



wax, a polyethylene glycol, the hydrate of an inorganic compound, etc. are mentioned. The paraffin hydrocarbon which has the melting point at about 5-50 degrees C especially preferably is desirable -20-80 degrees C. As such a paraffin hydrocarbon, an OKUTA decane (28 degrees C of melting points), a heptadecane (23 degrees C of melting points), a hexadecane (18 degrees C of melting points), etc. are mentioned, for example. In addition, it is also possible to use together two or more accumulation nature matter 3 which has the different melting point.

[0038] Next, the manufacturing process of the above-mentioned accumulation nature fiber is explained.

[0039] First, the accumulation nature matter and synthetic resin are mixed and the compound as a resin moldings of the shape of the shape of a pellet and granulation is formed. This compound heats the accumulation nature matter to the temperature beyond the melting point, and makes it liquefied, and synthetic resin is made to swell it after this. In addition, the accumulation nature matter and synthetic resin are heated, and it changes into a flow state or a melting state, and can perform kneading or churning mixing and fabricating in the shape of a pellet etc. by any method. And on the occasion of kneading, the usual kneading machine of 2 rolls, a Banbury mixer, an extruder, a biaxial kneading extruder, etc. is used, for example.

[0040] And spinning of the compound which mixes the accumulation nature matter 3, and the synthetic resin raw material for plastic fiber 2 is simultaneously carried out using conjugate compound spinning equipment, respectively, and spinning of the accumulation nature fiber 1 used as the bicomponent fiber of sheath-core cross-section structure is carried out.

[0041] Here, as for the accumulation nature matter 3, it is desirable one to 50 mass % and to set up preferably into accumulation nature fiber 1 at 3 - 30 mass %. Here, if it becomes less than 1 mass %, the effect of accumulation nature will not be acquired. Moreover, when it increases more than 50 mass %, intensity falls as fiber, handling nature falls, and there is a possibility of spoiling intensity, the touch, etc. in the case where it is used as the time of a foldout on cloth or clothes. this -- one to 50 mass % -- it considers as three to 30 mass % preferably

[0042] And the obtained fiber is processed into textiles, knitting, a nonwoven fabric, etc., and an accumulation \*\*\*\* member is formed. As for this accumulation \*\*\*\* member, as for what used only accumulation nature fiber 1, the thing processed with other fiber, or the object woven into cloth, accumulation nature fiber 1 can make it what is necessary be to just be prepared in part at least by any methods, such as the method of weaving in, and the method of knitting.

[0043] Moreover, you may add suitably compounding agents, such as a various additive, an antioxidant, an antioxidant, an antimicrobial agent, an antifungal agent, a coloring agent, a pigment, an antistatic agent, and a flame retarder, by an application, sinking in, etc. to an accumulation \*\*\*\* member. Furthermore, before forming in an accumulation \*\*\*\* member, you may add a compounding agent the spinning front of accumulation nature fiber 1, and after spinning.

[0044] According to the form of the above 1 operations, there are the following effects.

[0045] (1) Since abbreviation continuation is carried out and the accumulation nature matter 3 is mixed in a longitudinal direction in the \*\*\*\*\* direction in plastic fiber 2, it is hard coming to break to bending stress or hauling stress, and handling is easy and can improve manufacturability and the yield. Furthermore, it is hard to produce the breakage in the case of processing, such as weaving into cloth, for example, and the cloth of the good quality stabilized for a long period of time can be obtained, without having accumulation nature and being torn by the stress from the outside, such as bending.

[0046] (2) Since the sheath section of sheath-core structure is used as plastic fiber 2 and a core part is used as the accumulation nature matter 3, while the accumulation nature which did not flow out even if the accumulation nature matter 3 changed into the state where it was isolated from the exterior and dissolved by heat change, and was stabilized for a long period of time is obtained, handling is easy, and can improve manufacturability and the yield, for example, processing to cloth etc. also becomes easy. Furthermore, since it is in the state where the accumulation nature matter 3 was isolated from the exterior, change of the appearance in dissolution and solidification of the accumulation nature matter 3 is not produced, either, but good appearance can be acquired.

[0047] (3) Since heat-of-fusion energy and heat-of-solidification energy use the large accumulation



nature matter 3 as compared with plastic fiber 2, accumulation nature good as fiber can be obtained easily.

[0048] (4) Since the melting point used -20-degree-C or more accumulation nature matter 80 degrees C or less, when it is processed into cloth, for example and uses for clothes, good heat retaining property and heat insulation nature can be obtained.

[0049] (5) The state of the accumulation nature matter 3 carrying out abbreviation continuation in the \*\*\*\*\* direction at a longitudinal direction, and mixing in the state of carrying out \*\*\*\*\*

continuation of the compound which the accumulation nature matter 3 and synthetic resin were mixed, and was fabricated in the shape of a pellet in the core of synthetic resin at shaft orientations, in the synthetic resin of accumulation nature fiber 1 since compound spinning is carried out is acquired easily, and it is hard coming to break to bending stress or hauling stress, and handling is easy and can improve manufacturability and the yield. Moreover, it is hard to produce the breakage in the case of processing, such as weaving into cloth, for example, and the cloth of the good quality stabilized for a long period of time can be obtained, without having accumulation nature and being torn by the stress from the outside, such as bending. Furthermore, the accumulation nature which did not flow out even if the accumulation nature matter 3 changed into the state where it was isolated from the exterior and dissolved by heat change, and was stabilized for a long period of time is obtained, handling is easy, and improvement in manufacturability and the yield is obtained, for example, processing to cloth etc. can also form easy accumulation nature fiber 1 easily. Furthermore, since it is in the state where the accumulation nature matter 3 was isolated from the exterior, the appearance which does not produce change of the appearance in dissolution and solidification of the accumulation nature matter 3, either can form good accumulation nature fiber 1 easily.

[0050] In addition, this invention is not limited to the form of the 1 above-mentioned implementation, and the deformation in the range which can attain the purpose of this invention, and improvement are included in this invention.

[0051] Namely, although the accumulation nature fiber 1 of sheath-core cross-section structure was formed by the conjugate spinning method and explained in the form of the 1 above-mentioned implementation Plastic fiber 2 and the fibrous accumulation nature matter 3 For example, the letter of parallel or the composition which twines spirally, Spinning can be carried out to the accumulation nature fiber 1 of which structures which carry out abbreviation continuation and which the accumulation nature matter 3 mixes in the longitudinal direction of plastic fiber 2 in the \*\*\*\*\* direction, such as the shape of the shape of the shape of the shape of the shape of cross-section grain, a cross-section radial, and cross-section multicore, and a cross-section mosaic, and cross-section many \*\*\*\*, and a cross-section nebula.

[0052] Moreover, although compound spinning of the compound which mixed the accumulation nature matter 3 and synthetic resin, and the synthetic resin was carried out by the conjugate spinning method and they were explained, compound spinning of the accumulation nature matter 3 and the synthetic resin is carried out, for example, and accumulation nature fiber 1 is formed, or the accumulation nature fiber 1 which carries out spinning of the compound which mixed the accumulation nature matter 3 and synthetic resin, and the accumulation nature matter 3 mixes in plastic fiber 2 is formed, and is made.

[0053] And concrete structure, the quality of the material, a configuration, etc. at the time of carrying out this invention are good also as other structures, material, configurations, etc. within limits which can attain the purpose of this invention.

[0054]

[Example] Hereafter, an example and the example of comparison are given and this invention is explained more concretely.

N octadecane was blended by 10 mass % to [example 1] polypropylene, it kneaded using the biaxial kneading extruder in the state of heating melting, and the pellet-like compound was produced. and this compound -- a spinning raw material -- carrying out -- a melt spinning machine -- spinning -- carrying out -- a melt BURON method -- 80g of superintendent officers/, and accumulation \*\*\*\* of m2 -- the nonwoven fabric which is a member was produced

[0055] N octadecane was blended by 30 mass % to [example 2] nylon 6 .6, it kneaded using the biaxial kneading extruder in the state of heating melting, and the pellet-like compound was produced. And nylon 6 .6 were used as the spinning raw material, and compound spinning was carried out to this compound using the extruder type compound spinning machine. a compound serves as a core part and, as for this compound spinning, nylon 6 .6 serve as the sheath section -- as -- respectively -- separate -- fusing -- the object for sheath-core type spinning -- it wound up, after carrying out spinning as a bicomponent fiber from the mouthpiece and carrying out a heat set with a draw roller, and the accumulation nature fiber 1 which is the extension thread of 40 deniers and 24 filaments was obtained. The amount of the n octadecane in this obtained accumulation nature fiber 1 was about 21 mass %. And this obtained accumulation nature fiber 1 was wound around the surroundings of urethane fiber, it considered as single covered yarn type finished yarn, and the knitting as an accumulation \*\*\*\* member of the shape of the leg section of tights was produced with the circular knitting machine.

[0056] the [example 3] example 2 -- the same -- an extruder type compound spinning machine -- using -- a core part -- n octadecane and the sheath section -- nylon 6 -- carrying out -- each -- separate -- fusing -- the object for sheath-core type spinning -- it wound up, after carrying out spinning as a bicomponent fiber from the mouthpiece and carrying out a heat set with a draw roller, and the accumulation nature fiber 1 which is the extension thread of 70 deniers and 24 filaments was obtained. The amount of the n octadecane in this obtained accumulation nature fiber 1 was about 8 mass %. And the textiles as an accumulation \*\*\*\* member of the plain weave of superintendent officer 200 g/m were produced using this obtained accumulation nature fiber 1.

[0057] as the spinning raw material used for the spinning by the melt spinning machine of the [example 1 of comparison] example 1 -- polypropylene -- using -- the same -- accumulation \*\*\*\* of 80 g/m2 -- the nonwoven fabric of a member was produced.

[0058] Knitting was produced after carrying out spinning of the core part of the [example 2 of comparison] example 2 similarly using the nylon 6 .6 [ same ] as the sheath section.

[0059] Textiles were produced after carrying out spinning of the core part of the [example 3 of comparison] example 3 similarly using the same nylon 6 as the sheath section.

[0060] And as an experiment, the cloth member obtained in each above-mentioned example and the example of comparison is cut in the size of 10cm angle, is twisted around the surroundings of the degree meter of thermocouple mold temperature, respectively, and let it be experiment equipment. With this experiment equipment, it was left until the degree meter of thermocouple mold temperature became 20 degrees C under 20-degree C atmosphere, and it moved to the bottom of 50-degree C atmosphere after that, and time until the degree meter of thermocouple mold temperature becomes 40 degrees C was measured. This experimental result is shown in Table 1.

[0061]

[Table 1]

		40℃になるまでの時間
実施例	1	16分
	2	26分
	3	28分
比較例	1	7分
	2	15分
	3	18分

[0062] Time until it compares the example 1 or example 3 using the accumulation nature matter with the example 1 of comparison or the example 3 of comparison and becomes 40 degrees C from the result shown in this table 1 was long, and it was admitted that accumulation nature was discovered.

[0063] Moreover, clothes were produced using the nonwoven fabric of an example 1 and the example 1 of comparison, and the temperature in the clothes when wearing these clothes and repeating movement with the bottom of 20 degrees C atmosphere and 50-degree C atmosphere was measured. This experimental result is shown in drawing 2.

[0064] From the result shown in this drawing 2, it was admitted in the example 1 using accumulation nature fiber 1 as compared with the example 1 of comparison that a temperature gradient was small. Since the melting point of n octadecane is 28 degrees C, in case it moves from low temperature to an elevated temperature from this, n octadecane dissolves, endothermic energy acts, and these are considered that the temperature rise in clothes was stopped. On the contrary, in case it moves from an elevated temperature to low temperature, n octadecane solidifies, and it is thought that exoergic energy acted and the temperature fall was suppressed.

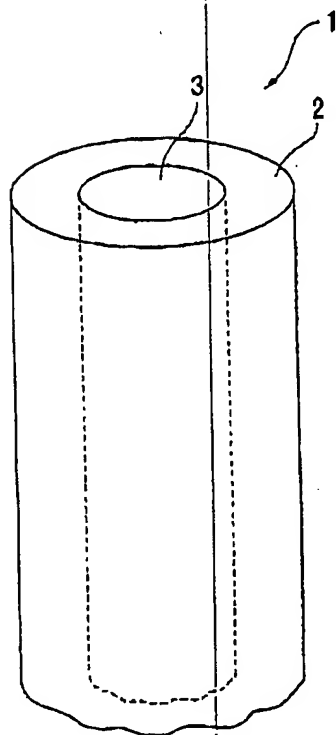
[0065]

[Effect of the Invention] The cloth of the good quality stabilized for a long period of time can be obtained without being hard to produce the breakage in the case of processing, such as weaving into cloth, for example, having accumulation nature, and being torn by the stress from the outside, such as bending, while it is hard coming to break to bending stress or hauling stress, and handling is easy and can improve manufacturability and the yield, since abbreviation continuation is carried out and the accumulation nature matter mixes in a longitudinal direction in the \*\*\*\*\* direction in plastic fiber according to this invention.

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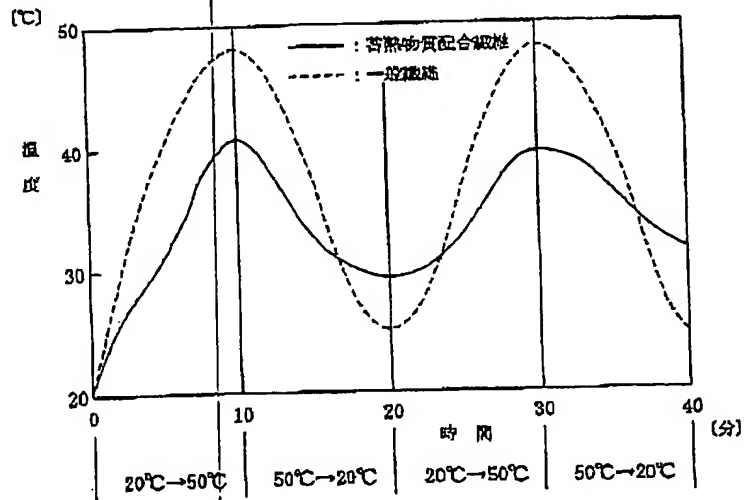
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Drawing selection [Representative drawing]



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## Drawing selection drawing 2



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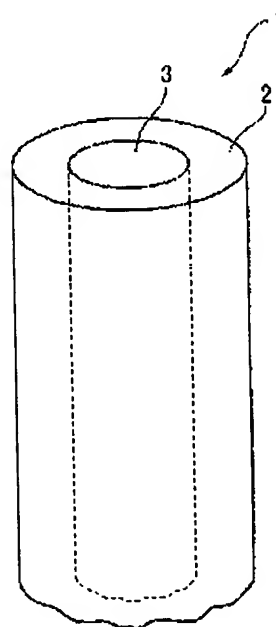
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(54) 【発明の名称】 蓄熱性繊維、その製造方法および蓄熱性布部材

(57) 【要約】

【課題】 蓄熱性を有し取り扱いが容易な蓄熱性繊維を提供する。

【解決手段】 芯部を蓄熱性物質3とし、鞘部を合成樹脂繊維2とした断面が芯鞘構造に蓄熱性繊維1を複合紡糸する。蓄熱性繊維1を用いて織物や編み物、不織布などの蓄熱性布部材を形成する。蓄熱性物質3は、例えば融点が-20℃以上80℃以下の融解熱・凝固熱エネルギーが比較的に大きいものを用いる。蓄熱性物質3は合成樹脂繊維2の軸方向に沿って連続するので、曲げ応力や引っ張り応力に対して折損しにくく、取扱が容易で、製造性および歩留まりを向上できる。蓄熱性物質3が外部から隔離した状態で、融解しても流れ出ず、長期間安定して蓄熱性を示し、蓄熱性物質3の融解および凝固での外観の変化も生じず、外観が良好である。



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## 【特許請求の範囲】

【請求項1】 合成樹脂繊維と、

この合成樹脂繊維に長手方向に略沿った方向に略連続して混入された蓄熱性物質とを具備したことを特徴とする蓄熱性繊維。

【請求項2】 請求項1に記載の蓄熱性繊維において、合成樹脂繊維を鞘部とし、蓄熱性物質を芯部として芯鞘構造に形成されたことを特徴とする蓄熱性繊維。

【請求項3】 請求項1または2に記載の蓄熱性繊維において、蓄熱性物質は、合成樹脂繊維に比して融解熱エネルギーおよび凝固熱エネルギーが大きいことを特徴とする蓄熱性繊維。

【請求項4】 請求項1ないし3のいずれかに記載の蓄熱性繊維において、蓄熱性物質は、融点が $-20^{\circ}\text{C}$ 以上 $80^{\circ}\text{C}$ 以下であることを特徴とする蓄熱性繊維。

【請求項5】 請求項1ないし4のいずれかに記載の蓄熱性繊維において、蓄熱性物質は、合成樹脂繊維の外周面から露出することなく混入されたことを特徴とする蓄熱性繊維。

【請求項6】 蓄熱性物質と合成樹脂とが混合されてペレット状に成形された樹脂混合物を紡糸することを特徴とする蓄熱性繊維の製造方法。

【請求項7】 蓄熱性物質と合成樹脂とが混合されてペレット状に成形された樹脂成形物を合成樹脂の中心部に軸方向に略沿って略連続する状態に複合紡糸することを特徴とする蓄熱性繊維の製造方法。

【請求項8】 蓄熱性物質と合成樹脂とを前記蓄熱性物質が芯鞘構造の芯部に位置する状態で複合紡糸すること

を特徴とする蓄熱性繊維の製造方法。

【請求項9】 請求項1ないし5のいずれかに記載の蓄熱性繊維を少なくとも一部に具備したことを特徴とする蓄熱性布部材。

【請求項10】 請求項6ないし8のいずれかに記載の蓄熱性繊維の製造方法により製造された蓄熱性繊維を少なくとも一部に具備したことを特徴とする蓄熱性布部材。

## 【発明の詳細な説明】

【0001】

【発明の属する技術分野】本発明は、蓄熱性部材を有した蓄熱性繊維、その製造方法および蓄熱性布部材に関する。

【0002】

【背景技術】従来から、温度変化の著しい環境において着用される衣服用等に、種々開発された蓄熱性を有した蓄熱部材が利用されている。このような蓄熱性を有する部材には、一般的に室温付近に融点を有する物質を封入したマイクロカプセルを布に塗布して固着したものや、マイクロカプセルを含有する合成樹脂を紡糸し、得られた

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繊維をファブリックすなわち布地としたもの等が知られている。

【0003】

【発明が解決しようとする課題】しかしながら、従来のマイクロカプセルを布に塗布して固着させたものでは、マイクロカプセルを布に固着させるための接着剤が必要となる。そして、この接着剤は、十分な蓄熱性および耐久性を発現させるために多量に使用しなければならなくなり、塗布された後の布の風合いが硬質となる問題がある。

【0004】また、例えば衣服を着用した際における快適性を高めるためには、保温性に加えて透湿性、吸放湿性、耐水性等も必要とされる。ところが、マイクロカプセルを接着剤にて布等に塗布して固着した場合、保温性は向上するものの、バインダにより布の透湿性等が低下し、衣服として良好に機能しないおそれがある。

【0005】一方、マイクロカプセルは、構造上ある程度の大きさで形成される。このことにより、マイクロカプセルを含有する合成樹脂を紡糸して得られた繊維を布地にするものでは、繊維の径寸法に対してマイクロカプセルの粒子径が大きい。このため、紡糸工程や布への織り込み工程などの際に切断すなわち糸切れを生じるおそれがある。

【0006】本発明は、このような点に鑑みて、蓄熱性を有し取り扱いが容易な蓄熱性繊維、その製造方法および蓄熱性布部材を提供することを目的とする。

【0007】

【課題を解決するための手段】本発明の蓄熱性繊維は、合成樹脂繊維と、この合成樹脂繊維に長手方向に略沿った方向に略連続して混入された蓄熱性物質とを具備したことを特徴とする。

【0008】本発明における蓄熱性物質としては、蓄熱性を有するものであれば特に限定はなく、用途に応じて適当な融点を有するものを適宜選択して使用することができる。例えば、パラフィン系炭化水素、天然ワックス、石油ワックス、ポリエチレングリコール、無機化合物の水和物等が挙げられる。特に、 $-20\sim 80^{\circ}\text{C}$ 、好ましくは約 $5\sim 50^{\circ}\text{C}$ に融点を有するパラフィン系炭化水素が好ましい。このようなパラフィン系炭化水素としては、例えば、オクタデカン（融点 $28^{\circ}\text{C}$ ）、ヘプタデカン（融点 $23^{\circ}\text{C}$ ）、ヘキサデカン（融点 $18^{\circ}\text{C}$ ）等が挙げられる。なお、異なる融点を有する複数の蓄熱性物質を併用することも可能である。

【0009】合成樹脂繊維を構成する合成樹脂としては、特に限定はなく、例えばナイロン、ポリエステル、ポリウレタン、ビニロン、エチレン-酢酸ビニル共重合体、ビニリデン、ポリ塩化ビニル、アクリル樹脂、ポリエチレン、ポリプロピレン、ラテックス等を使用できる。また、合成樹脂繊維を構成する合成樹脂としては、アセテート、ジアセテート、トリアセテートなどの半台



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成樹脂を使用できる。さらには、レーヨンなどの再生繊維材料なども使用できる。

【0010】本発明では、合成樹脂繊維内に長手方向に略沿った方向に略連続して蓄熱性物質を混入するので、曲げ応力や引っ張り応力に対して折損しにくくなり、取扱が容易で、製造性および歩留まりの向上が得られるとともに、例えば布地に縫り込むなどの加工の際の折損を生じにくく、蓄熱性を有し折曲などの外部からの応力で破れることなく長期間安定した良好な品質の布地が得られる。

【0011】本発明の蓄熱性繊維は、合成樹脂繊維を鞘部とし、蓄熱性物質を芯部として芯鞘構造に形成されたことを特徴とする。

【0012】本発明では、芯鞘構造の鞘部を合成樹脂繊維とし、芯部を蓄熱性物質とするので、蓄熱性物質が外部から隔離された状態となり、熱変動により融解しても流れ出すことはなく、長期間安定した蓄熱性が得られるとともに、取扱が容易で、製造性および歩留まりの向上が得られ、例えば布地などへの加工も容易となる。さらには、蓄熱性物質が外部から隔離された状態であることから、蓄熱性物質の融解および凝固での外観の変化も生じない。

【0013】本発明の蓄熱性繊維は、蓄熱性物質は、合成樹脂繊維に比して融解熱エネルギーおよび凝固熱エネルギーが大きいことを特徴とする。

【0014】本発明では、合成樹脂繊維に比して融解熱エネルギーおよび凝固熱エネルギーが大きい蓄熱性物質を用いるので、繊維として良好な蓄熱性が得られる。

【0015】本発明の蓄熱性繊維は、蓄熱性物質は、融点が $-20^{\circ}\text{C}$ 以上 $80^{\circ}\text{C}$ 以下であることを特徴とする。

【0016】本発明では、融点が $-20^{\circ}\text{C}$ 以上 $80^{\circ}\text{C}$ 以下の蓄熱性物質を用いるので、例えば布地に加工して衣服に利用した場合に、良好な保温性および保冷性が得られる。

【0017】ここで、融点が $-20^{\circ}\text{C}$ より低くなると、良好な蓄熱性を示す物質の入手が困難で、コストが増大する。また、 $-20^{\circ}\text{C}$ より低い環境および $80^{\circ}\text{C}$ より高い環境となる条件が来ても、衣服としての需要が限られ、コストが増大するおそれがある。このことにより、融点が $-20^{\circ}\text{C}$ 以上 $80^{\circ}\text{C}$ 以下の蓄熱性物質を用いる。

【0018】本発明の蓄熱性繊維では、蓄熱性物質は、合成樹脂繊維の外周面から露出することなく混入されたことを特徴とする。

【0019】本発明では、蓄熱性物質を合成樹脂繊維の外周面から露出することなく混入するので、蓄熱性物質が外部から隔離された状態となり、熱変動により融解しても流れ出すことはなく、長期間安定した蓄熱性が得られるとともに、取扱が容易で、製造性および歩留まりの向上が得られ、例えば布地などへの加工も容易となる。さらには、蓄熱性物質が外部から隔離された状態である

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ことから、蓄熱性物質の融解および凝固での外観の変化も生じない。

【0020】本発明の蓄熱性繊維の製造方法は、蓄熱性物質と合成樹脂とが混合されてペレット状に成形された樹脂混合物を紡糸することを特徴とする。

【0021】本発明では、蓄熱性物質と合成樹脂とが混合されてペレット状に成形された樹脂混合物を紡糸するので、蓄熱性繊維の合成樹脂内に蓄熱性物質が長手方向に略沿った方向に略連続して混入する状態が容易に得られ、曲げ応力や引っ張り応力に対して折損しにくくなり、取扱が容易で、製造性および歩留まりの向上が得られるとともに、例えば布地に縫り込むなどの加工の際の折損を生じにくく、蓄熱性を有し折曲などの外部からの応力で破れることなく長期間安定した良好な品質の布地が得られる。

【0022】本発明の蓄熱性繊維の製造方法は、蓄熱性物質と合成樹脂とが混合されてペレット状に成形された樹脂成形物を合成樹脂の中心部に軸方向に略沿って略連続する状態に複合紡糸することを特徴とする。

【0023】本発明では、蓄熱性物質と合成樹脂とが混合されてペレット状に成形された樹脂成形物を合成樹脂の中心部に軸方向に略沿って略連続する状態に複合紡糸するので、蓄熱性繊維の合成樹脂内に蓄熱性物質が長手方向に略沿った方向に略連続して混入する状態が容易に得られ、曲げ応力や引っ張り応力に対して折損しにくくなり、取扱が容易で、製造性および歩留まりの向上が得られるとともに、例えば布地に縫り込むなどの加工の際の折損を生じにくく、蓄熱性を有し折曲などの外部からの応力で破れることなく長期間安定した良好な品質の布地が得られる。

【0024】さらに、蓄熱性物質が外部から隔離された状態の蓄熱性繊維が得られ、熱変動により融解しても流れ出すことはなく、長期間安定した蓄熱性が得られるとともに、取扱が容易で、製造性および歩留まりの向上が得られ、例えば布地などへの加工も容易となる。さらには、蓄熱性物質が外部から隔離された状態であることから、蓄熱性物質の融解および凝固での外観の変化も生じない。

【0025】本発明の蓄熱性繊維の製造方法は、蓄熱性物質と合成樹脂とを前記蓄熱性物質が芯鞘構造の芯部に位置する状態で複合紡糸することを特徴とする。

【0026】本発明では、蓄熱性物質と合成樹脂とを蓄熱性物質が芯鞘構造の芯部に位置する状態で複合紡糸するので、蓄熱性繊維の合成樹脂内に蓄熱性物質が長手方向に略沿った方向に略連続して混入する状態が容易に得られ、曲げ応力や引っ張り応力に対して折損しにくくなり、取扱が容易で、製造性および歩留まりの向上が得られるとともに、例えば布地に縫り込むなどの加工の際の折損を生じにくく、蓄熱性を有し折曲などの外部からの応力で破れることなく長期間安定した良好な品質の布地

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が得られる。

【0027】さらに、蓄熱性物質が外部から隔離された状態の蓄熱性繊維が得られ、熱変動により融解しても流れ出ることはなく、長期間安定した蓄熱性が得られるとともに、取扱が容易で、製造性および歩留まりの向上が得られ、例えば布地などへの加工も容易となる。さらに、蓄熱性物質が外部から隔離された状態であることから、蓄熱性物質の融解および凝固での外観の変化も生じない。

【0028】また、蓄熱性物質が芯部となり合成樹脂が鞘部となる芯鞘構造が容易に得られ、蓄熱性物質の含有量の増大も図れる。

【0029】本発明の蓄熱性布部材は、請求項1ないし5のいずれかに記載の蓄熱性繊維を少なくとも一部に具備したことを特徴とする。

【0030】本発明では、蓄熱性を有し取扱も容易な蓄熱性繊維を用いることで、加工が容易で外部からの応力で破れることなく長期間安定した良好な品質が得られる。そして、スキーウェア、レインウェアなどのスポーツ衣料、パンティストッキング、シャツ、背広等の一般衣料、シーツ、中綿などの寝具、手袋、靴材、あるいは保温・保冷の要求される食品包装材などに好適に利用できる。

【0031】本発明の蓄熱性布部材は、請求項6ないし8のいずれかに記載の蓄熱性繊維の製造方法により製造された蓄熱性繊維を少なくとも一部に具備したことを特徴とする。

【0032】本発明では、蓄熱性を有し取扱も容易な蓄熱性繊維の製造性および歩留まりの向上が得られる請求項6ないし8のいずれかに記載の蓄熱性繊維の製造方法により製造された蓄熱性繊維を用いるので、加工が容易で外部からの応力で破れることなく長期間安定した良好な品質が得られる。そして、スキーウェア、レインウェアなどのスポーツ衣料、パンティストッキング、シャツ、背広等の一般衣料、シーツ、中綿などの寝具、手袋、靴材、あるいは保温・保冷の要求される食品包装材などに好適に利用できる。

【0033】

【発明の実施の形態】以下、本発明の一実施の形態を図面に基いて説明する。

【0034】図1において、1は蓄熱性繊維で、この蓄熱性繊維1は、芯鞘構造に形成されている。すなわち、蓄熱性繊維1は、略円筒状の合成樹脂繊維2の中心軸の位置に、長手方向である軸方向に略沿って略円柱状に連続して蓄熱性物質3が一体に設けられ、合成樹脂繊維2を鞘部とし、蓄熱性物質3を芯部として形成されている。そして、蓄熱性物質3は、合成樹脂繊維2の外周面から露出することなく合成樹脂繊維2内に覆われた状態となっている。

【0035】そして、合成樹脂繊維2を構成する合成樹

脂としては、特に限定はなく、例えばナイロン、ポリエステル、ポリウレタン、ビニロン、エチレン-酢酸ビニル共重合体、ビニリデン、ポリ塩化ビニル、アクリル樹脂、ポリエチレン、ポリプロピレン、ラテックス等を使用できる。また、合成樹脂繊維2を構成する合成樹脂としては、アセテート、シアセテート、トリアセテートなどの半合成樹脂を使用できる。さらに、レーヨンなどの再生繊維材料なども使用できる。

【0036】また、蓄熱性物質3は、例えば融点が $-20^{\circ}\text{C}$ 以上 $80^{\circ}\text{C}$ 以下のものを用いる。ここで、融点が $-20^{\circ}\text{C}$ より低くなると、良好な蓄熱性を示す物質の入手が困難で、コストが増大する。また、 $-20^{\circ}\text{C}$ より低い環境および $80^{\circ}\text{C}$ より高い環境となる条件がまれで、衣服としての需要に限られ、コストが増大するおそれがある。このことにより、融点が $-20^{\circ}\text{C}$ 以上 $80^{\circ}\text{C}$ 以下の蓄熱性物質を用いる。

【0037】なお、蓄熱性物質3としては、融解熱・凝固熱エネルギーが比較的に大きい、例えば少なくとも合成樹脂繊維の合成樹脂より大きい蓄熱性を有するものであれば特に限定はなく、用途に応じて適当な融点を有するものを適宜選択して使用することができる。例えば、パラフィン系炭化水素、天然ワックス、石油ワックス、ポリエチレングリコール、無機化合物の水和物等が挙げられる。特に、 $-20\sim 80^{\circ}\text{C}$ 、好ましくは約 $5\sim 50^{\circ}\text{C}$ に融点を有するパラフィン系炭化水素が好ましい。このようなパラフィン系炭化水素としては、例えば、オクタデカン（融点 $28^{\circ}\text{C}$ ）、ヘプタデカン（融点 $23^{\circ}\text{C}$ ）、ヘキサデカン（融点 $18^{\circ}\text{C}$ ）等が挙げられる。なお、異なる融点を有する複数の蓄熱性物質3を併用することも可能である。

【0038】次に、上記蓄熱性繊維の製造工程について説明する。

【0039】まず、蓄熱性物質と合成樹脂とを混合し、ペレット状あるいは顆粒状の樹脂成形物としてのコンパウンドを形成する。このコンパウンドは、蓄熱性物質を融点以上の温度に加熱して液状にし、この後、合成樹脂に溶解させる。なお、蓄熱性物質および合成樹脂を加熱し、流動状態あるいは熔融状態にして混練あるいは攪拌混合してペレット状に成形するなど、いずれの方法でもできる。そして、混練に際しては、例えば2本ロール、バンバリーミキサ、押出機、2軸混練押出機などの通例の混練機が用いられる。

【0040】そして、蓄熱性物質3を混入するコンパウンドと、合成樹脂繊維2用の合成樹脂原料とを、それぞれコンジュゲート複合紡糸装置を用いて同時に紡糸し、芯鞘断面構造の複合繊維となった蓄熱性繊維1を紡糸する。

【0041】ここで、蓄熱性物質3は、蓄熱性繊維1中に1～50質量%、好ましくは3～30質量%に設定することが好ましい。ここで、1質量%より少なくなる

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と、蓄熱性の効果が得られない。また、50質量%より多くなると、繊維として強度が低下して取扱性が低下し、布地への織り込み時や衣服として使用した場合での強度や肌触り等を損なうおそれがある。このことにより、1～50質量%、好ましくは3～30質量%とする。

【0042】そして、得られた繊維は、織物、編み物、不織布などに加工され、蓄熱性布部材が形成される。この蓄熱性布部材は、蓄熱性繊維1のみを用いたものや、他の繊維とともに加工されたもの、あるいは布地に織り込まれた物など、少なくとも一部に蓄熱性繊維1が設けられていればよく、織り込む方法や編み込む方法など、いずれの方法でもできる。

【0043】また、蓄熱性布部材に種類の添加剤、老化防止剤、酸化防止剤、抗菌剤、防カビ剤、着色剤、顔料、帯電防止剤、難燃剤などの配合剤を適宜塗布や含浸などに添加してもよい。さらに、蓄熱性布部材に形成する前、例えば蓄熱性繊維1の紡糸前や紡糸後に配合剤を添加してもよい。

【0044】上述のような一実施の形態によれば、次のような効果がある。

【0045】(1)合成樹脂繊維2内に長手方向に略沿った方向に略連続して蓄熱性物質3を混入するので、曲げ応力や引っ張り応力に対して折損しにくくなり、取扱が容易で、製造性および歩留まりを向上できる。さらに、例えば布地に織り込むなどの加工の際の折損を生じにくく、蓄熱性を有し折曲などの外部からの応力で破れることなく長期間安定した良好な品質の布地を得ることができる。

【0046】(2)芯鞘構造の鞘部を合成樹脂繊維2とし、芯部を蓄熱性物質3とするので、蓄熱性物質3が外部から隔離された状態となり、熱変動により融解しても流れ出すことはなく、長期間安定した蓄熱性が得られるとともに、取扱が容易で、製造性および歩留まりを向上でき、例えば布地などへの加工も容易となる。さらに、蓄熱性物質3が外部から隔離された状態であることから、蓄熱性物質3の融解および凝固での外観の変化も生じず、良好な外観を得ることができる。

【0047】(3)合成樹脂繊維2に比して融解熱エネルギーおよび凝固熱エネルギーが大きい蓄熱性物質3を用いるので、繊維として良好な蓄熱性を容易に得ることができる。

【0048】(4)融点が-20℃以上80℃以下の蓄熱性物質を用いるので、例えば布地に加工して衣服に利用した場合に、良好な保温性および保冷性を得ることができる。

【0049】(5)蓄熱性物質3と合成樹脂とが混合されてベレット状に成形されたコンパウンドを合成樹脂の中心部に軸方向に略沿って略連続する状態に複合紡糸するので、蓄熱性繊維1の合成樹脂内に蓄熱性物質3が長手

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方向に略沿った方向に略連続して混入する状態が容易に得られ、曲げ応力や引っ張り応力に対して折損しにくくなり、取扱が容易で、製造性および歩留まりを向上できる。また、例えば布地に織り込むなどの加工の際の折損を生じにくく、蓄熱性を有し折曲などの外部からの応力で破れることなく長期間安定した良好な品質の布地を得ることができる。さらに、蓄熱性物質3が外部から隔離された状態となり、熱変動により融解しても流れ出すことはなく、長期間安定した蓄熱性が得られ、取扱が容易で、製造性および歩留まりの向上が得られ、例えば布地などへの加工も容易な蓄熱性繊維1を容易に形成できる。さらに、蓄熱性物質3が外部から隔離された状態であることから、蓄熱性物質3の融解および凝固での外観の変化も生じない外観が良好な蓄熱性繊維1を容易に形成できる。

【0050】なお、本発明は上記一実施の形態に限定されるものではなく、本発明の目的を達成できる範囲での変形、改良は、本発明に含まれるものである。

【0051】すなわち、上記一実施の形態において、コンジュゲート紡糸法により芯鞘断面構造の蓄熱性繊維1を形成して説明したが、例えば合成樹脂繊維2と繊維状の蓄熱性物質3とが並列状あるいは螺旋状に絡まる構成や、断面木目状、断面放射状、断面多芯状、断面モザイク状、断面多島海状、断面星雲状など、合成樹脂繊維2の長手方向に略沿った方向に略連続して蓄熱性物質3が混入するいずれの構造の蓄熱性繊維1に紡糸できる。

【0052】また、蓄熱性物質3および合成樹脂を混合したコンパウンドと、合成樹脂とをコンジュゲート紡糸法により複合紡糸して説明したが、例えば蓄熱性物質3と合成樹脂とを複合紡糸して蓄熱性繊維1を形成したり、蓄熱性物質3および合成樹脂とを混合したコンパウンドを紡糸して合成樹脂繊維2内に蓄熱性物質3が混入する蓄熱性繊維1を形成してできる。

【0053】そして、本発明を実施する際の具体的な構造、材質および形状等は、本発明の目的を達成できる範囲内で他の構造、材料および形状等としてもよい。

【0054】

【実施例】以下、実施例および比較例を挙げて本発明をより具体的に説明する。

【実施例1】ポリプロピレンに対しn-オクタデカンを10質量%で配合し、加熱溶融状態で2軸混練押出機を用いて混練し、ベレット状のコンパウンドを作製した。そして、このコンパウンドを紡糸原料とし、溶融紡糸機で紡糸し、メルトブローン方式で目付け80g/m<sup>2</sup>の蓄熱性布部材である不織布を作製した。

【0055】【実施例2】ナイロン6、6に対してn-オクタデカン30質量%で配合し、加熱溶融状態で2軸混練押出機を用いて混練し、ベレット状のコンパウンドを作製した。そして、このコンパウンドと、ナイロン6、6を紡糸原料とし、エクストルーダ型複合紡糸機を

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用いて複合紡糸した。この複合紡糸は、コンパウンドが芯部、ナイロン6、6が鞘部となるようにそれぞれ別々に溶融し、芯鞘型紡糸用口金から複合繊維として紡糸し、延伸ローラで熱セットした後に巻き上げ、40デニール、24フィラメントの延伸糸である蓄熱性繊維1を得た。この得られた蓄熱性繊維1中のn-オクタデカン量は、約21質量%であった。そして、この得られた蓄熱性繊維1をウレタン繊維の周りに巻き、シングルカバードヤーン型の加工糸とし、丸編み機でタイツのレッグ部状の蓄熱性布部材としてのニットを作製した。

【0056】〔実施例3〕実施例2と同様にエクストルーダ型複合紡糸機を用い、芯部をn-オクタデカン、鞘部をナイロン6とし、それぞれを別々に溶融し、芯鞘型紡糸用口金から複合繊維として紡糸し、延伸ローラで熱セットした後に巻き上げ、70デニール、24フィラメントの延伸糸である蓄熱性繊維1を得た。この得られた蓄熱性繊維1中のn-オクタデカン量は、約8質量%であった。そして、この得られた蓄熱性繊維1を用いて目付け200g/m<sup>2</sup>の平織りの蓄熱性布部材としての織物を作製した。

【0057】〔比較例1〕実施例1の溶融紡糸機による紡糸に使用する紡糸原料として、ポリプロピレンを用い、同様に80g/m<sup>2</sup>の蓄熱性布部材の不織布を作製した。

【0058】〔比較例2〕実施例2の芯部を鞘部と同じナイロン6、6を用いて同様に紡糸した後、ニットを作製した。

【0059】〔比較例3〕実施例3の芯部を鞘部と同じナイロン6を用いて同様に紡糸した後、織物を作製した。

【0060】そして、実験として、上記各実施例および比較例で得られた布部材を、10cm角の大きさに切断し、熱電対型温度計の周りにそれぞれ巻き付け、実験装置とする。この実験装置で、20℃の雰囲気下に熱電対型温度計が20℃になるまで放置し、その後50℃の雰囲気下に移動し、熱電対型温度計が40℃になるまでの時間を測定した。この実験結果を表1に示す。

【0061】

【表1】

		40℃になるまでの時間
実施例	1	16分
	2	26分
	3	28分
比較例	1	7分
	2	15分
	3	18分

【0062】この表1に示す結果から、蓄熱性物質を用いた実施例1ないし実施例3は、比較例1ないし比較例3に比し、40℃になるまでの時間が長く、蓄熱性が発現されていることが認められた。

【0063】また、実施例1および比較例1の不織布を用いて衣服を作製し、これら衣服を着用して20℃の雰囲気下と50℃の雰囲気下との移動を繰り返した時の衣服内の温度を測定した。この実験結果を図2に示す。

【0064】この図2に示す結果から、蓄熱性繊維1を用いた実施例1では、比較例1に比して温度差が小さいことが認められた。これらは、n-オクタデカンの融点が28℃であるため、これより低温から高温に移る際にn-オクタデカンが溶融して吸熱エネルギーが作用し、衣服内の温度上昇が抑えられたものと考えられる。逆に、高温から低温に移る際にはn-オクタデカンが凝固し、発熱エネルギーが作用して温度低下が抑制されたものと考えられる。

【0065】

【発明の効果】本発明によれば、合成樹脂繊維内に長手方向に略沿った方向に略連続して蓄熱性物質が混入するため、曲げ応力や引っ張り応力に対して折損しにくくなり、取扱が容易で、製造性および歩留まりを向上できるとともに、例えば布地に織り込むなどの加工の際の折損を生じにくく、蓄熱性を有し折曲などの外部からの応力で破れることなく長期間安定した良好な品質の布地を得ることができる。

【図面の簡単な説明】

【図1】本発明の一実施の形態の蓄熱性繊維を示す一部を切り欠いた斜視図である。

【図2】本発明の実施例1および比較例1で得られた蓄熱性繊維を有する不織布の温度変化を表すグラフである。

【符号の説明】

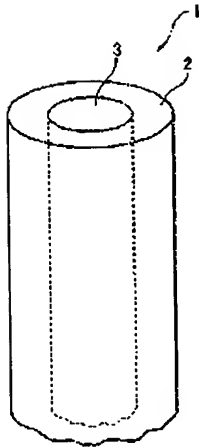
- 1 蓄熱性繊維
- 2 合成樹脂繊維
- 3 蓄熱性物質

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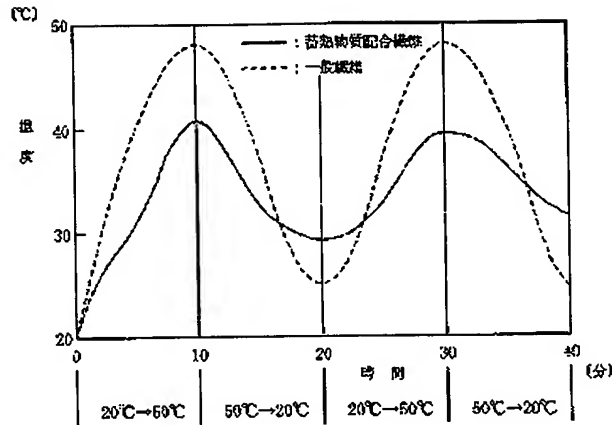
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【図1】



【図2】



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